

REMARKS

Claims 1-20 remain in the application.

35 U.S.C. § 103(a)

AAPA in view of Hundt and Cha – Claims 1-20

Claims 1-20 stand rejected under 35 U.S.C. § 103(a) as being obvious over the Applicants' Admitted Prior Art (hereinafter "the AAPA") in combination with U.S. Patent No. 5,590,462 issued January 7, 1997 to Michael Hundt and Carlo Cognetti (hereinafter "the Hundt patent") and U.S. Patent No. 6,242,798 issued June 5, 2001 to Gi-Bon Cha and Byeong-Duck Lee (hereinafter "the Cha patent") (Office Action, pages 2-4).

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

The Office is respectfully reminded that "hindsight reconstruction" cannot be used to select isolated disclosures in the prior art to arrive at a determination of obviousness. "It is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the prior art so that the claimed invention is rendered obvious. The mere fact that the prior art may be modified in the manner suggested by the Examiner does not

make the modification obvious unless the prior art suggested the desirability of the modification. *In re Fritch*, 972 F.2d 1260, 23 USPQ2d 1780 (Fed. Cir. 1992).

The Office Action relies on the AAPA (i.e., the background section of the present application) for a teaching of a flip chip attached to a substrate with an underfill material dispersed therebetween. The Office Action admits that the AAPA fails to disclose forming a through hole extending from the substrate first surface to the substrate second surface and disposing the underfill material through the through hole.

The Hundt patent is relied upon for teaching "a through hole extending from the substrate first surface to the substrate second surface and disposing the underfill (figure 2, 18) through the through hole." However, as stated in Applicants' 9/5/2002 Response, this is an inaccurate statement of the teaching of the Hundt patent. The Hundt patent teaches dispensing a thermally conductive adhesive (not an underfill material) between a substrate and a quad flat pack-type of a microelectronic device through a through hole.

In the Final Office Action's "Response to Arguments", the Examiner contends that "the thermally conductive adhesive material as taught by Hundt is an underfill material because the applicant does not specifically disclose what type of material the underfill material comprises." This is an incorrect. As one of ordinary skill in the art knows, the terms "adhesive" and "underfill material" have very distinct definitions. An adhesive material is used to attach one component to another. An underfill material is used with flip-chip arrangements, after the microelectronic die is attached to the substrate with the conductive bumps. Thus, the underfill material is not used for attachment purposes. As one skilled in the art knows, the underfill material is used to distribute and minimize the solder joint strains, thus improving thermal

cycling fatigue life. That is precisely what is described in the Background of the present specification at page 2, line 3-5, "To enhance the reliability of the solder bumps 216 connecting the microelectronic die pads 206 and the substrate lands 212, an underfill material is used to mechanically and physically reinforce them." Thus, it is clear the term "underfill material" is not analogous to the adhesive as taught in the Hundt patent.

Thus, it is clear that the Hundt patent involves a different field of endeavor in terms of microelectronic devices (quad flat pack versus flip-chip) and materials (adhesive versus underfill material). "In order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the invention was concerned." *In re Oetiker*, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992) (See M.P.E.P. 2141.01(a)). Thus, the Hundt patent is neither in the field of applicant's endeavor nor reasonably pertinent to the particular problem with which the present invention is concerned.

Furthermore, a teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). A showing of a suggestion, teaching, or motivation to combine prior teachings "must be clear and particular." *In re Dembiczak*, 175 F.3d 994, 50 U.S.P.Q.2d 1614 (Fed. Cir. 1999). There is simply no teaching or suggestion in the Hundt patent that such adhesive material would be applicable for use as an underfill material in a flip-chip configuration or that a through hole in the substrate would be an appropriate way to dispense underfill type of materials between a flip-chip and a substrate.

The Office Action continues with the statement that “[n]either AAPA nor Hundt disclose positioning the microelectronic die and the substrate such that the microelectronic die is gravitationally below the substrate.” The Cha patent is relied upon for teaching “the epoxy can be applied from the top down through a through hole instead of injected upward.” It is assumed that the Office is referring to claims 7-12 and 20, as they are the only claims that contain such a limitation.

Again, “[i]n order to rely on a reference as a basis for rejection of an applicant’s invention, the reference must either be in the field of applicant’s endeavor or, if not, then be reasonably pertinent to the particular problem with which the invention was concerned.” *In re Oetiker*, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992) (See M.P.E.P. 2141.01(a)). The Cha patent involves a different field of endeavor, as it is merely encapsulating a wirebonded chip with an encapsulation material. The Cha patent teaches dispensing an encapsulant material (i.e., epoxy resin) into what is in essence a closed container (see FIG. 4A of the Cha patent). The presently claimed invention is a flip-chip configuration wherein there is a gap around the periphery of the flip-chip microelectronic die, not a “closed container”, as shown in the Cha patent. Thus, with such a gap, conventional wisdom would assume that dispensing the underfill material with the microelectronic die gravitationally below the substrate would result in the underfill material running out of the gap and dripping from the microelectronic die. Thus, it should be clear that encapsulating a wirebonded chip in a closed container is a different endeavor from dispensing the underfill material as described in the present invention.

Furthermore, a teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on

applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). A showing of a suggestion, teaching, or motivation to combine prior teachings "must be clear and particular." *In re Dembiczak*, 175 F.3d 994, 50 U.S.P.Q.2d 1614 (Fed. Cir. 1999). There is simply no teaching or suggestion in the Cha patent that a through hole in the substrate would be an appropriate way to dispense underfill type of materials between a flip-chip and a substrate with the flip-chip below the substrate.

Therefore, it respectfully appears to the Applicant that the Office has impermissibly taken isolated, non-analogous art and used the claimed invention as template to piece together the teachings of the prior art so that the claimed invention is rendered obvious. It also appears the Office did not take into account only knowledge which was within the level of ordinary skill in art at the time the claimed invention was made and includes knowledge gleaned from the Applicants' disclosure, thus the reconstruction is improper. *In re McLaughlin*, 443 F.2d 1392, 1395, 170 USPQ 209, 212 (CCPA 1971).

In view of the foregoing remarks, the Applicants request allowance of the application. Please forward further communications to the address of record. If the Examiner needs to contact the below-signed attorney to further the prosecution of the application, the contact number is (503) 712-1682.

Dated: January 30, 2003

Respectfully submitted,



Robert G. Winkle
Attorney for Applicants
Reg. No. 37,474